

Appl. No. 09/728,908
Amdt. dated 02/08/2005
Rcply to Office action of 09/08/2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended):

A line card within a switching node coupled to a network, said line card comprising:

a link interface for transmitting communications along a communication link within said network;

said link interface including a plurality of logical ~~entities; interfaces~~, a sum of minimum required bandwidths of said plurality of logical interfaces being less than a link capacity;

~~each logical entity is governed by a set of bandwidth usage rules;~~

each of said plurality of logical interfaces including a plurality of class of service buffers (CoSBs), a sum of minimum required bandwidths of said plurality of CoSBs being less than a minimum bandwidth of each of said plurality of logical interfaces;

each of said plurality of logical interfaces including a plurality of partitions, a sum of minimum required bandwidths of said plurality of partitions being less than a minimum bandwidth of each of said plurality of logical interfaces;

each of said plurality of CoSBs including a first plurality of classes of service (CoSs), a sum of minimum required bandwidths of said first plurality of CoSs being less than a minimum bandwidth of each of said plurality of CoSBs;

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each of said plurality of partitions including a second plurality of CoSs, a sum of minimum required bandwidths of said second plurality of CoSs being less than a minimum bandwidth of each of said plurality of partitions; and wherein a first aggregation of said first plurality of CoSs for said plurality of CoSBs is the same as a second aggregation of said second plurality of CoSs for said plurality of partitions.

2. (cancelled)

3. (currently amended):

The line card of claim 1, 2, wherein each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~the bandwidth usage rules include a~~ maximum allowable bandwidth usage and a minimum bandwidth guarantee.

4. (currently amended):

The line card of claim 3, wherein the maximum allowable bandwidth is the maximum amount of bandwidth that each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~any logical entity~~ can reserve.

5. (currently amended):

The line card of claim 3 wherein the minimum bandwidth guarantee is the guaranteed bandwidth assigned to each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs, a given logical entity, such that the guaranteed bandwidth guarantee is not affected by bandwidth usage or configuration changes of any

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other of said plurality of CoSBs, said plurality of partitions, and said first plurality of CoSs
logical entity.

6. (currently amended):

The line card of claim 3 wherein the line card ~~can check~~ checks the minimum bandwidth
guarantee of each of said plurality of CoSBs, each of said plurality of partitions, and each of
said first plurality of CoSs. ~~logical entity~~.

7. (currently amended):

The line card of claim 3 wherein the line card ~~can check~~ checks the maximum bandwidth
usage of each of said plurality of CoSBs, each of said plurality of partitions, and each of said
first plurality of CoSs. ~~bandwidth~~.

8. (currently amended):

The line card of claim 3, wherein the line card prevents a change in any of said plurality of
CoSBs, said plurality of partitions, and said first plurality of CoSs if said change would result
in improper minimum bandwidth relationships for the line card. ~~can enforce the set of~~
~~bandwidth usage rules when the configuration of the logical entities changes~~.

9. (currently amended):

A method comprising:

configuring ~~transmitting communications along a communication link of a network to~~
include network, the communication link including a plurality of logical interfaces such

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that a sum of minimum required bandwidths of said plurality of logical interfaces is less than a link capacity; entities; and

governing each logical entity by a set of bandwidth usage rules;

configuring each of said plurality of logical interfaces to include a plurality of class of service buffers (CoSBs) such that a sum of minimum required bandwidths of said plurality of CoSBs is less than a minimum bandwidth of each of said plurality of logical interfaces;

configuring each of said plurality of logical interfaces to include a plurality of partitions such that a sum of minimum required bandwidths of said plurality of partitions is less than a minimum bandwidth of each of said plurality of logical interfaces;

configuring each of said plurality of CoSBs to include a first plurality of classes of service (CoSs) such that a sum of minimum required bandwidths of said first plurality of CoSs is less than a minimum bandwidth of each of said plurality of CoSBs;

configuring each of said plurality of partitions to include a second plurality of CoSs such that a sum of minimum required bandwidths of said second plurality of CoSs is less than a minimum bandwidth of each of said plurality of partitions; and

wherein a first aggregation of said first plurality of CoSs for said plurality of CoSBs is the same as a second aggregation of said second plurality of CoSs for said plurality of partitions.

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10. (cancelled)

11. (currently amended):

The method of claim 9, 10, wherein each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~the bandwidth usage rules~~ include a maximum allowable bandwidth usage and a minimum bandwidth guarantee.

12. (currently amended):

The method of claim 11, wherein the maximum allowable bandwidth is the maximum amount of bandwidth that each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~any logical entity~~ can reserve.

13. (currently amended):

The method of claim 11 wherein the minimum bandwidth guarantee is the guaranteed bandwidth assigned to each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs, ~~a given logical entity~~, such that the guarantee is not affected by bandwidth usage or configuration changes of any other of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs. ~~logical entity~~.

14. (currently amended):

The method of claim 11 further comprising checking the minimum bandwidth guarantee of each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs. ~~logical entity~~.

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15. (currently amended):

The method of claim 11 further comprising checking the maximum bandwidth usage of each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs, bandwidth.

16. (currently amended):

The method of claim 11 further comprising preventing a change in any of said plurality of CoSBs, said plurality of partitions, and said first plurality of CoSs if said change would result in improper minimum bandwidth relationships for the line card, enforcing the set of bandwidth usage rules when the configuration of the logical entities changes.

17. (currently amended):

An apparatus comprising:

means for configuring transmitting communications along a communication link of a network to include network, the communication link including a plurality of logical interfaces such that a sum of minimum required bandwidths of said plurality of logical interfaces is less than a link capacity; entities; and

means for governing each logical entity by a set of bandwidth usage rules.

means for configuring each of said plurality of logical interfaces to include a plurality of class of service buffers (CoSBs) such that a sum of minimum required bandwidths of said plurality of CoSBs is less than a minimum bandwidth of each of said plurality of logical interfaces;

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means for configuring each of said plurality of logical interfaces to include a plurality of partitions such that a sum of minimum required bandwidths of said plurality of partitions is less than a minimum bandwidth of each of said plurality of logical interfaces;

means for configuring each of said plurality of CoSBs to include a first plurality of classes of service (CoSs) such that a sum of minimum required bandwidths of said first plurality of CoSs is less than a minimum bandwidth of each of said plurality of CoSBs;

means for configuring each of said plurality of partitions to include a second plurality of CoSs such that a sum of minimum required bandwidths of said second plurality of CoSs is less than a minimum bandwidth of each of said plurality of partitions; and

wherein a first aggregation of said first plurality of CoSs for said plurality of CoSBs is the same as a second aggregation of said second plurality of CoSs for said plurality of partitions.

18. (cancelled)

19. (currently amended):

The apparatus of claim ~~17, 18~~, wherein each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~the bandwidth usage rules~~ include a maximum allowable bandwidth usage and a minimum bandwidth guarantee.

20. (currently amended):

A computer readable medium having instructions which, when executed by a processing system, cause the system to perform a method comprising:

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configuring transmitting communications along a communication link of a network to include network, the communication link including a plurality of logical interfaces such that a sum of minimum required bandwidths of said plurality of logical interfaces is less than a link capacity; entities; and

governing each logical entity by a set of bandwidth usage rules;

configuring each of said plurality of logical interfaces to include a plurality of class of service buffers (CoSBs) such that a sum of minimum required bandwidths of said plurality of CoSBs is less than a minimum bandwidth of each of said plurality of logical interfaces;

configuring each of said plurality of logical interfaces to include a plurality of partitions such that a sum of minimum required bandwidths of said plurality of partitions is less than a minimum bandwidth of each of said plurality of logical interfaces;

configuring each of said plurality of CoSBs to include a first plurality of classes of service (CoSs) such that a sum of minimum required bandwidths of said first plurality of CoSs is less than a minimum bandwidth of each of said plurality of CoSBs;

configuring each of said plurality of partitions to include a second plurality of CoSs such that a sum of minimum required bandwidths of said second plurality of CoSs is less than a minimum bandwidth of each of said plurality of partitions; and

wherein a first aggregation of said first plurality of CoSs for said plurality of CoSBs is the same as a second aggregation of said second plurality of CoSs for said plurality of partitions.

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21. (cancelled)

22. (currently amended):

The medium of claim 20, 21, wherein each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~the bandwidth usage rules~~ include a maximum allowable bandwidth usage and a minimum bandwidth guarantee.

23. (currently amended):

The medium of claim 22, wherein the maximum allowable bandwidth is the maximum amount of bandwidth that each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~any logical entity~~ can reserve.

24. (currently amended):

The medium of claim 22, wherein the minimum bandwidth guarantee is the guaranteed bandwidth assigned to each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs, ~~a given logical entity~~, such that the guarantee is not affected by bandwidth usage or configuration changes of any other of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs, ~~logical entity~~.

25. (currently amended):

The medium of claim 22, wherein the executed instructions cause the system to further perform: checking the minimum bandwidth guarantee of each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs, ~~logical entity~~.

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26. (currently amended):

The medium of claim 22, wherein the executed instructions further cause the system to perform: checking the maximum bandwidth usage of each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs, bandwidth.

27. (currently amended):

The medium of claim 22, wherein the executed instructions further cause the system to perform: preventing a change in any of said plurality of CoSBs, said plurality of partitions, and said first plurality of CoSs if said change would result in improper minimum bandwidth relationships for the line card, enforcing the set of bandwidth usage rules when the configuration of the logical entities changes.

28. (currently amended):

An apparatus comprising a controller to: ~~comprising:~~

configure a transmitter to transmit communications along a communication link of a network to include network, the communication link including a plurality of logical interfaces such that a sum of minimum required bandwidths of said plurality of logical interfaces is less than a link capacity; entities; and

~~a governor to govern each logical entity by a set of bandwidth usage rules.~~

configure each of said plurality of logical interfaces to include a plurality of class of service buffers (CoSBs) such that a sum of minimum required bandwidths of said plurality of CoSBs is less than a minimum bandwidth of each of said plurality of logical interfaces;

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configure each of said plurality of logical interfaces to include a plurality of partitions such that a sum of minimum required bandwidths of said plurality of partitions is less than a minimum bandwidth of each of said plurality of logical interfaces;

configure each of said plurality of CoSBs to include a first plurality of classes of service (CoSs) such that a sum of minimum required bandwidths of said first plurality of CoSs is less than a minimum bandwidth of each of said plurality of CoSBs;

configure each of said plurality of partitions to include a second plurality of CoSs such that a sum of minimum required bandwidths of said second plurality of CoSs is less than a minimum bandwidth of each of said plurality of partitions; and

wherein a first aggregation of said first plurality of CoSs for said plurality of CoSBs is the same as a second aggregation of said second plurality of CoSs for said plurality of partitions.

29. (cancelled)

30. (currently amended):

The apparatus of claim 28, wherein each of said plurality of CoSBs, each of said plurality of partitions, and each of said first plurality of CoSs ~~the bandwidth usage rules~~ include a maximum allowable bandwidth usage and a minimum bandwidth guarantee.